The Center for Reproduction of Endangered Species (CRES) is operated by the Zoological Society of San Diego

C·R·E·S® REPORT

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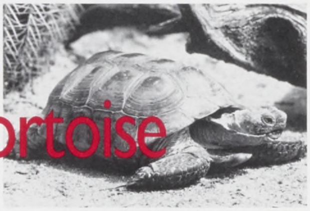


Racing to Save the Desert Tortoise

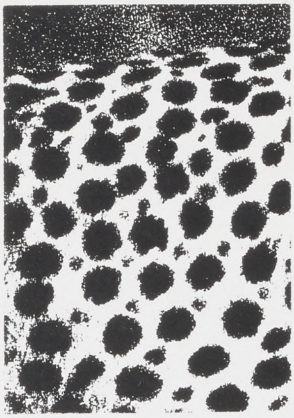
Not everyone recognizes the unassuming desert tortoise *Gopherus agassizi* as California's official state reptile, nor do they realize that it's listed among the growing numbers of the state's endangered species. At CRES the race is on to ensure its survival with studies by Endocrinologist Dr. Valentine Lance that will provide data leading to better management and successful reproduction for this species. Also involved in this project are fellow CRES Researchers Dr. David Rostal and Dr. Allison Alberts. Dr. Rostal, an expert with ultrasound imaging technique in sea turtles, is looking for correlations between ovary development and hormone levels. Dr. Alberts, an expert in reptile chemical communication, is studying relationships between chin gland activity, testosterone levels, and aggression between male desert tortoises.

The alarming decline in desert tortoise populations in California and Nevada during the past decade—as much as 80 percent—can be linked to several factors. The five-year drought has had an impact. Habitat destruction has resulted in a loss of adequate food sources. Additional stresses are due to human activity—such as development, cattle and sheep ranching, and off-road vehicle use. The desert tortoise is also battling an upper respiratory tract disease (URTD), one of the most serious threats to its long-term survival. Scientists do not know how this disease entered the desert tortoise population, and there is no known cure. Good nutrition helps to stabilize this condition, but the desert tortoise quickly succumbs to the disease once stress enters its environment. A new blood test that determines if the tortoise has been exposed to URTD will help in the effort to stop the spread of this disease.

Nevada has set aside a 200-acre desert tortoise natural area, through cooperation with the Bureau of Land Management (BLM). At the Desert Tortoise Conservation Center near Las Vegas, hundreds of tortoises have been brought in from areas threatened by development and are now part of a study group. Here, Dr. Lance studies male and female reproductive cycles, as well as the effects of stress and disease on these animals. Each month blood is collected from 20 males and 30 females, and chin gland secretions are taken from the males. Reproductive, stress, and thyroid hormones are measured in the blood, along with calcium, which gives a good correlation between hormone levels and ovary development.

Long-term targets set for this project hope to answer critical questions for this species. This year, radio-telemetry units will be put on 60 wild desert tortoises. Researchers will follow these animals for 2 years, taking blood samples each month. What is missing is basic information on the species that has not been collected: reproductive and hormonal cycles, data on nutrition, behavior, physiology and stress, population numbers, and optimal management conditions. Can desert tortoises be relocated to a suitable habitat after they are displaced? After all the biological parameters are evaluated, where is the best habitat and what is the ideal number of desert tortoises for a given area? Results of hormone studies linked to stress levels in captivity, and compared with data from wild populations, may yet prevent the desert tortoise from becoming extinct in its native habitat. ■

Inside CRES



Infectious Diseases

With the arrival of Postdoctoral Research Fellow Dr. Roya Lahijani, the studies on malignant catarrhal fever (MCF) are renewed. Investigation of this herpesvirus progresses on two fronts, combining basic research and its practical application. The "mapping" of the MCF virus continues. The structure and function of its DNA have yet to be well characterized. As Senior Technician Rob Klieforth explains, "You can go through different levels of detail. If one thinks about a set of encyclopedias as representing the information in various viral genomes, it is like the difference between looking at the outside of the 'M' volume, then scanning the page headings, and finally reading the articles themselves." Also, techniques for the detection of the virus in animals are under investigation. It is hoped that a viral DNA amplification technique called the polymerase chain reaction (PCR) will prove effective in detecting the MCF virus. If this is not the case, the basic research accomplished throughout the project will provide the groundwork for investigating alternative methods of detection. ■

Pathology

The primary responsibility of the pathology division is to provide a diagnostic postmortem service for the Society's collection. Dr. Marilyn Anderson and her staff perform thorough necropsies on each animal that dies. According to Dr. Anderson, information gained from necropsies benefits the living collection. The clinical pathology laboratory also performs routine lab work (e.g., blood work and fecal and urine analyses) on all living animals in the collection. In addition to their diagnostic work, the pathology division provides another important service. After the necropsy is complete, specimens are collected. Due to the uniqueness of the Society's animal collection, specimens from the remains of these animals may be extremely valuable to taxonomists, researchers, and educators. Requests come from across the country for various organs and tissues from a variety of species. Dr. Anderson maintains an ongoing "wish list" for researchers and institutions. When an animal dies, the list is consulted to ascertain which organs and tissues are requested. The requests are prioritized and filled when possible. Thus the loss of each animal is minimized by maximizing the information gained from its death. ■

Virology

Dr. Michael Worley is characterizing a new herpesvirus, which he has discovered in slow loris white blood cells. Viruses are very rare in prosimians and this may be the first documented case of a prosimian with a herpesvirus infection. Thus far, studies have not matched this virus to any known primate herpesvirus. During routine physical examinations, blood samples were collected from eight slow lorises. Due to their symptoms of recurrent ocular discharge, skin problems, gingivitis, and periodontal disease, they were tested for viral infections. An unidentified herpesvirus was detected. It is not yet known if this virus is responsible for the symptoms in the slow lorises. Other institutions with similar symptoms in their slow loris collections have contacted Dr. Worley. If funding becomes available, Dr. Worley would like to continue his efforts to identify this herpesvirus, determine its prevalence in captive slow loris populations, and study the effects, if any, on the animals. ■

Reproductive Physiology

Dr. Barbara Durrant presented a paper to the American Society of Andrology in March that described modified freezing and thawing techniques for both Przewalski's wild horse semen and domestic horse semen. Dr. Durrant discovered that Przewalski's horse sperm that were frozen following domestic horse

procedures were of low motility when thawed. Upon investigating 20 semen-freezing and 4 semen-thawing techniques, she discovered that with Przewalski's horse sperm, unlike the domestic horse, the thawing technique is very important. Using the most effective of these procedures, Dr. Durrant has nearly tripled the quality of thawed Przewalski's horse sperm. While the refinement of semen freezing and thawing techniques continues, so does the semen collection. "We'd like to collect semen on as many stallions as possible, . . . especially those who are to be reintroduced [to the wild] and will not be available to us afterwards," Dr. Durrant observes. This enables these stallions to continue their contribution to their species' future. ■

• Genetics

Dr. Oliver Ryder and his staff have completed their DNA fingerprinting of the California condors. Analysis of DNA obtained from blood samples drawn for routine medical examinations has resulted in the definition of DNA bands for each condor. Using a newly developed statistical model, analysis of the sharing of DNA bands between individual birds revealed the presence of what Dr. Ryder calls three distinct clans of condors. Each bird is more closely related to its clan members than to other condors. One clan consists entirely of individuals that were known to belong to a single family. The second clan also contains known parent-offspring relationships. Most of the birds whose parentage was heretofore unknown appear to be closely related and make up the third clan. To prevent inbreeding at this stage of the condor recovery program, it is preferable to pair the birds with mates from another clan. Unknowingly, some condors had been paired with clan members, and these pairs have not reproduced. The California Condor Recovery Project Team is currently arranging suitable matches, based on the findings generated at CRES. ■

• Behavior

Dr. Nancy C. Harvey and Helena Fitch-Snyder, along with volunteers, are studying the vocalizations of the African and Asian elephants at the Wild Animal Park. Previous research has shown that much of the elephants' "language" occurs well below the range of human hearing. These infrasound vocalizations are thought to travel as far as 2½ miles. Over a 3-month period, 72 hours of infrasound vocalizations were recorded. The elephants' behavior, hormone levels, and audible vocalizations were also noted. After the infrasound vocalizations are classified, their occurrence will be compared with the behavior and hormone data. It is hoped that this study will allow researchers to associate elephant vocalizations with their behavior. And, thus far, it appears that certain vocalizations only occur in certain situations. Dr. Harvey sees many practical applications for this knowledge. For instance, recordings of elephant infrasound vocalizations may enable field researchers to "call" elephants to them for an accurate census of the wild population. Captive elephant enclosures could be enlarged to encompass many acres if the elephants could be "called in" for their necessary husbandry procedures. Captive-breeding programs could also benefit from an accurate method of determining the cow's receptivity to mating, through her infrasound vocalizations. ■

• Comparative Physiology

Drs. John Phillips and Allison Alberts have received funding from the National Science Foundation for a two-year project studying the Cuban ground iguana *Cyclura nubila* at the United States Guantanamo Bay Naval Station. All seven species of *Cyclura* are endangered and are found only on the Caribbean islands. As with the monitor lizard project in Africa, the optimal temperature and moisture conditions for the successful hatching of eggs in this species will be determined. All of the hatchlings will be marked and some will be released immediately. The remainder will be released over the next few months, some when they have doubled their hatching weight and the others when they have reached five times their hatching weight. Through observation of their survival rates, the researchers will determine the optimal release age. They will also study the mate preferences of female iguanas. Within 2.5- to 5-acre fenced areas, the large males will be removed. The females will be observed to determine if they will allow the smaller males to mate. Little is known of these large terrestrial iguanas, and these studies will provide invaluable information for the management of both captive and free-ranging populations. ■

TOKTEN Fellow Joins CRES

The infectious diseases division of CRES welcomed its new postdoctoral fellow, Dr. Roya Lahijani, in February. Sponsored by a combination of grants from the **Institute of Museum Services** and **The Bay Foundation**, Dr. Lahijani will conduct studies on the viral agent of malignant catarrhal fever. Dr. Lahijani was born in Iran, where she completed high school. She then continued her education in England and the United States. Dr. Lahijani received her Bachelor of Science degree in chemistry and her Master of Science degree in biochemistry from the University of Oklahoma; her Ph.D. in cellular and molecular biology is from the University of Nevada. In 1991, Dr. Lahijani was awarded a fellowship through the highly competitive TOKTEN (Transfer of Knowledge through Expatriate Nationals) program, which is administered by the United Nations World Development Program. The Iranian Ministry of Education and the University of Tehran recently opened a major biotechnology and genetic engineering center in Tehran. The TOKTEN team visited Tehran in November as consultants for equipment purchases and development of laboratory technology. Dr. Lahijani responded to a nationwide search to fill the CRES position. She has always been interested in wildlife conservation, and she desired a position where her work would have an immediate practical application.

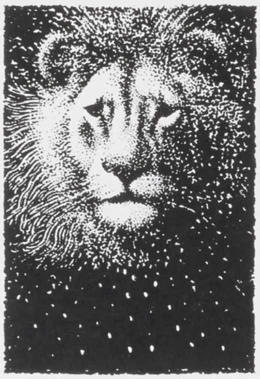
A Gift for Endangered Species

CRES benefits from a wonderful new product on the market called SASSABY. The SASSABY line of cosmetic and jewelry organizers is designed for the teen-to-twenty market, as well as the 30-plus consumer who welcomes SASSABY's upscale appeal.

SASSABY may be the new company on the scene, but its dynamic president, Leonie Mateer, is credited by industry peers for having masterminded the original organizer-box category itself in the United States only three years ago. The former New Zealander says that America's teens had nothing to carry their cosmetics in, and she never skipped a beat to fill this market niche. Now with her own company, Mateer and group draw from their collective experience in the marketplace to create the next generation of fabulous designer fashion boxes to hold products for makeup, hair, nails, skin care, appliances, personal care, and jewelry.

CRES receives the proceeds from every nameplate ordered for a SASSABY organizer. Plus, information about CRES is available in every SASSABY organizer. SASSABY products can be purchased at J.C. Penney, Wal-Mart, Target, Sav-on Drugs, and Long's Drug Stores.

SAN DIEGO ZOO



Show Your Family Pride For Father's Day!

Looking for a fun and unusual gift to tell Dad he's special on his big day?

Show your pride in him with a wild gift. This Father's Day, we're offering you a special Adopt-A-Lion package that your Dad will be wild about. For only $49* you can give him an attractive, personalized adoption certificate (perfect for his den), two complimentary passes to the San Diego Zoo or the San Diego Wild Animal Park, a special card to announce your gift adoption, and an exclusive, brushed-brass lion bookmark.

And, there is the knowledge that your contribution will help us help these rare and precious animals.

It's easy and fun to adopt! Fill out the adoption form in this issue of *CRES Report* and mail it, along with your check, to the address provided. For more information, call the Zoo at (619) 557-3974, weekdays between 9 A.M. and 4 P.M.

*Special adoption price good until June 10, 1992, to ensure delivery by Father's Day.

■ **YES!** I want to show my family pride by adopting a Lion:

Name(s)____________________

Address____________________

City__________ State________ Zip________

Please sign the special card announcing my gift adoption as follows:

____

Your Name(s)____________________

Address____________________

City__________ State________ Zip________

Phone__________ (Day) __________ (Evening) Member Number________

☐ Also, please enter my own adoption of a Lion at the special rate of $49 for one year.

Please make checks payable to the Zoological Society of San Diego and mail to:

The Zoological Society of San Diego / Adopt-An-Animal Program
P.O. Box 271 • San Diego, California 92112

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Recent Grants

A generous grant from the **Joan Irvine Smith and Athalie Clarke Foundation** was recently made in support of the CRES endowment and for a rhinoceros endocrinology study. Grants from **The Bay Foundation** and the **Institute of Museum Services**, a Federal agency, are funding vital research on the viral agent of malignant catarrhal fever. A behavioral sound enrichment study for gorillas and African bird species is being conducted by CRES, thanks to donations from an anonymous donor and **Mr. and Mrs. David L. Binney.** Also, grants from the **Lee Romney Foundation, Inc.** and the **John and Beverly Stauffer Foundation** have been given in support of genetic management and reintroduction of the Przewalski's horse to its native habitat.

Sponsors for Summer Interns

Each spring undergraduate students from around the country apply for summer intern positions at CRES. These three-month positions are funded by individuals and corporations who recognize the value of placing students in research situations that will extend their experience. Past interns have demonstrated high levels of success in their academic and professional careers, such as veterinary and human medicine.

Funds are still needed for four intern positions. Each intern receives a stipend of $3,000. If you would like to sponsor an intern for the summer, please call Amy Parrott at the Zoo at (619) 231-1515, extension 4249.

Kenyan Geneticist at CRES

Mohammed Abdi Jama, a research scientist from the National Museums of Kenya, is completing his studies incorporating the latest genetic analysis techniques under Dr. Oliver Ryder and his staff. When Mr. Jama returns to his native Nairobi, he will have the knowledge to continue his studies on the "family trees" of Kenya's black rhino populations. Approximately one-half of Kenya's black rhinos are now in sanctuaries that provide protection from poachers and offer some veterinary attention. It is important to gather genetic information from the first generation of rhinos to reproduce in Kenya's rhino sanctuaries. To prevent inbreeding in these small populations, it is important to determine the family lines of each black rhino in Kenya's sanctuaries. When the rhinos are received from the wild, their ears are notched for identification. The skin tissue from these ear notches provides the genetic material for Mr. Jama's studies. DNA specimens from 31 black rhinos accompanied him to San Diego. The Zoological Society of San Diego is greatly indebted to the **Pew Charitable Trusts** for funding the Genetics Technology Transfer project and to Dr. Oliver Ryder for his assistance and support. ■

Editor:
Mary Sekulovich

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Special thanks to
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contributors:

Valerie Hare
Judy Kinsell
Amy Parrott

■

Graphic Design:
Lee Merrill

■

Photographs/Illustrations by:
Ron Garrison
Ken Kelley
Bill Noonan

SAN DIEGO ZOO
SAN DIEGO WILD ANIMAL PARK

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